

Reconstructed Landscapes: Preliminary Results from the Northwestern Gulf of Mexico

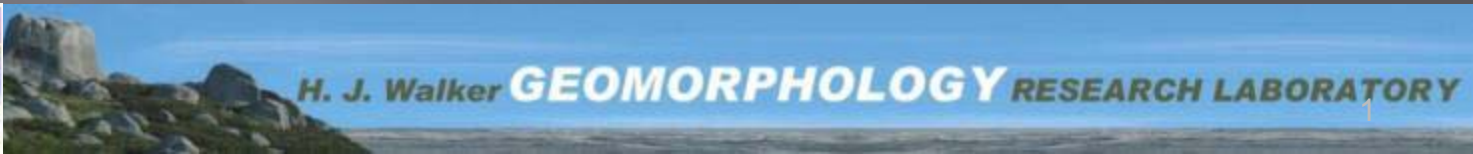
Patrick Hesp and Amanda Evans

Geography and Anthropology, LSU

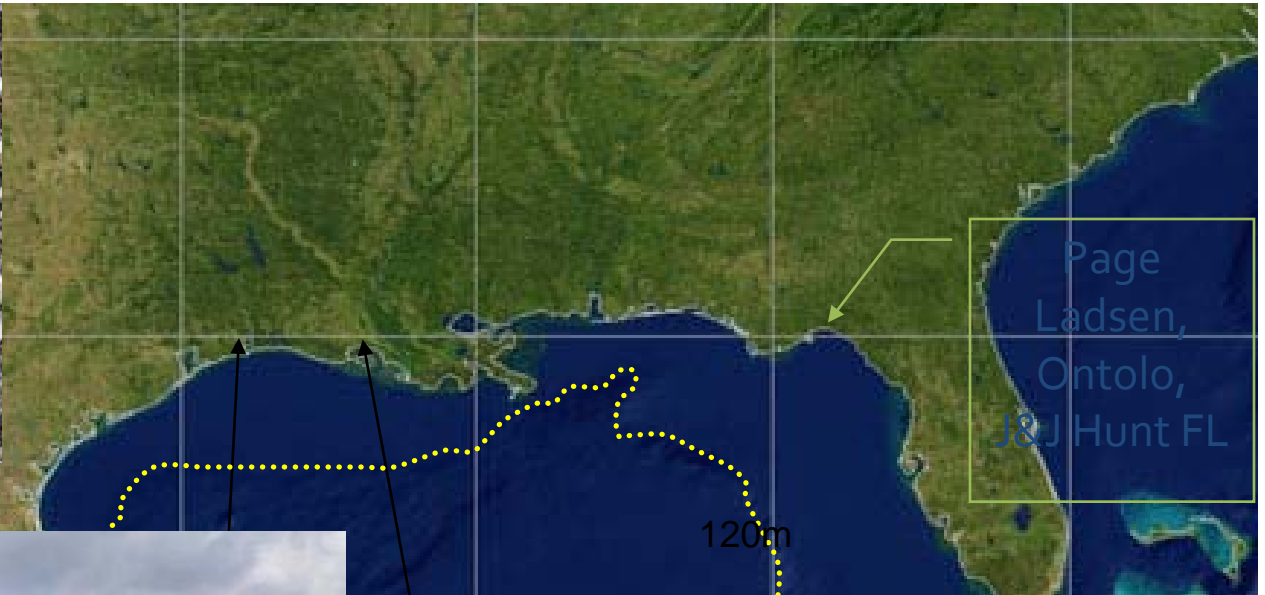
Brooks Ellwood, Sophie Warny,

Graziela da Silva, and Barun sen Gupta

Geology and Geophysics, LSU



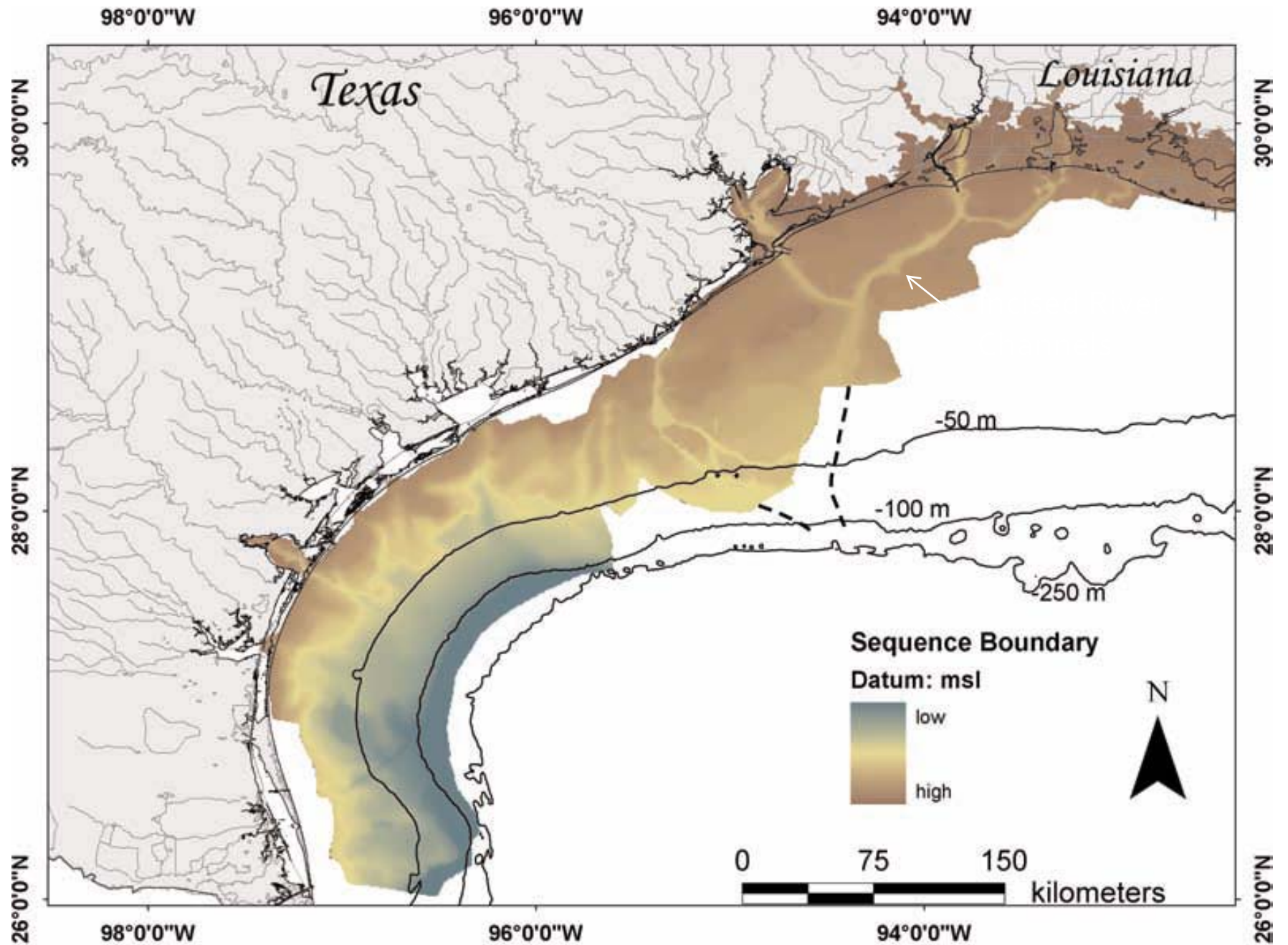
Prehistoric Potential in Federal Waters



McFaddin Beach, TX
~11,000 BP



Avery Island, LA
~11,500 BP

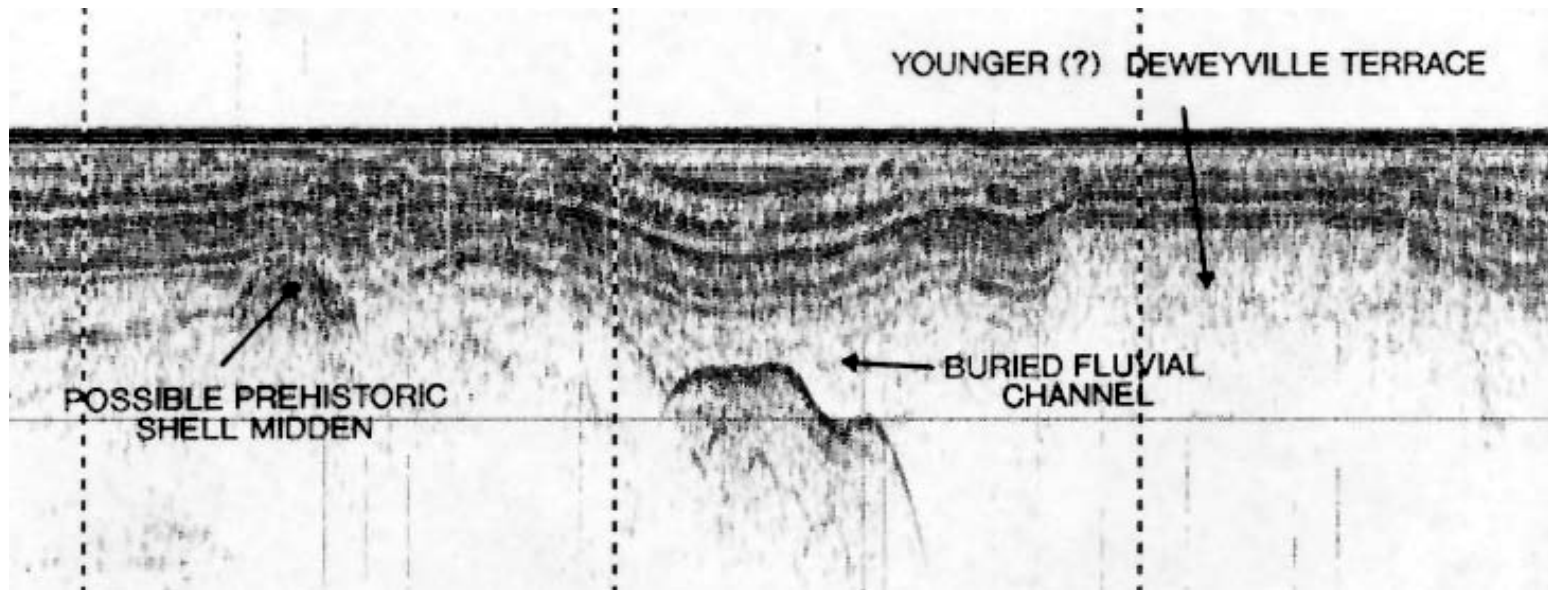
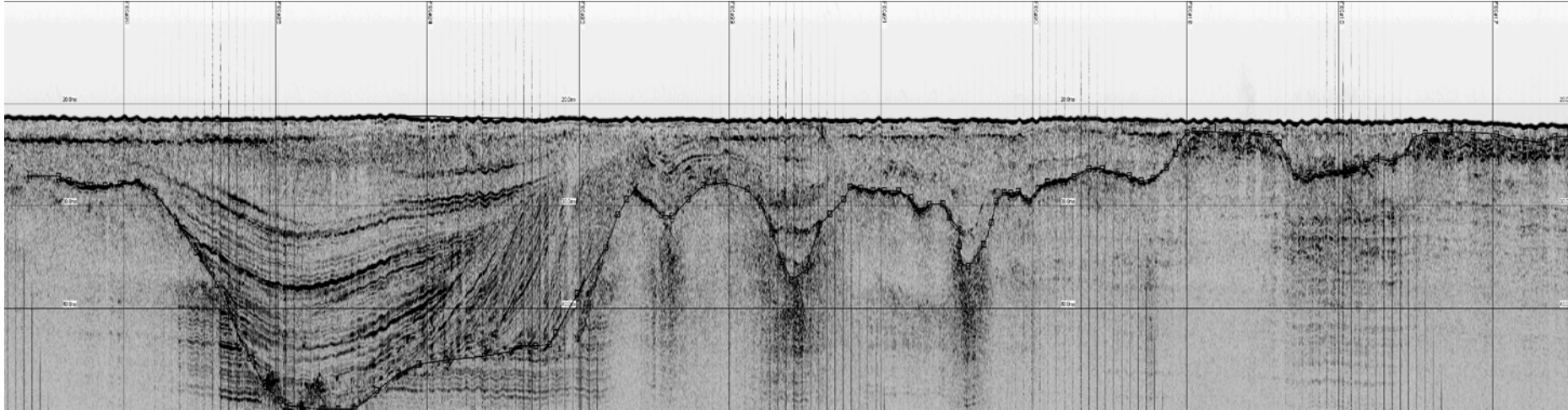


Locations of lowstand incised valleys from Simms et al. 2008

Objectives

- Primary
 - Identify reported features
- Secondary
 - Identify additional features
 - Identify appropriate sea-level curve
 - Assess geophysical survey & interpretation parameters
 - line spacing intervals
 - frequency

Primary Objectives: GA 356 & HI 160

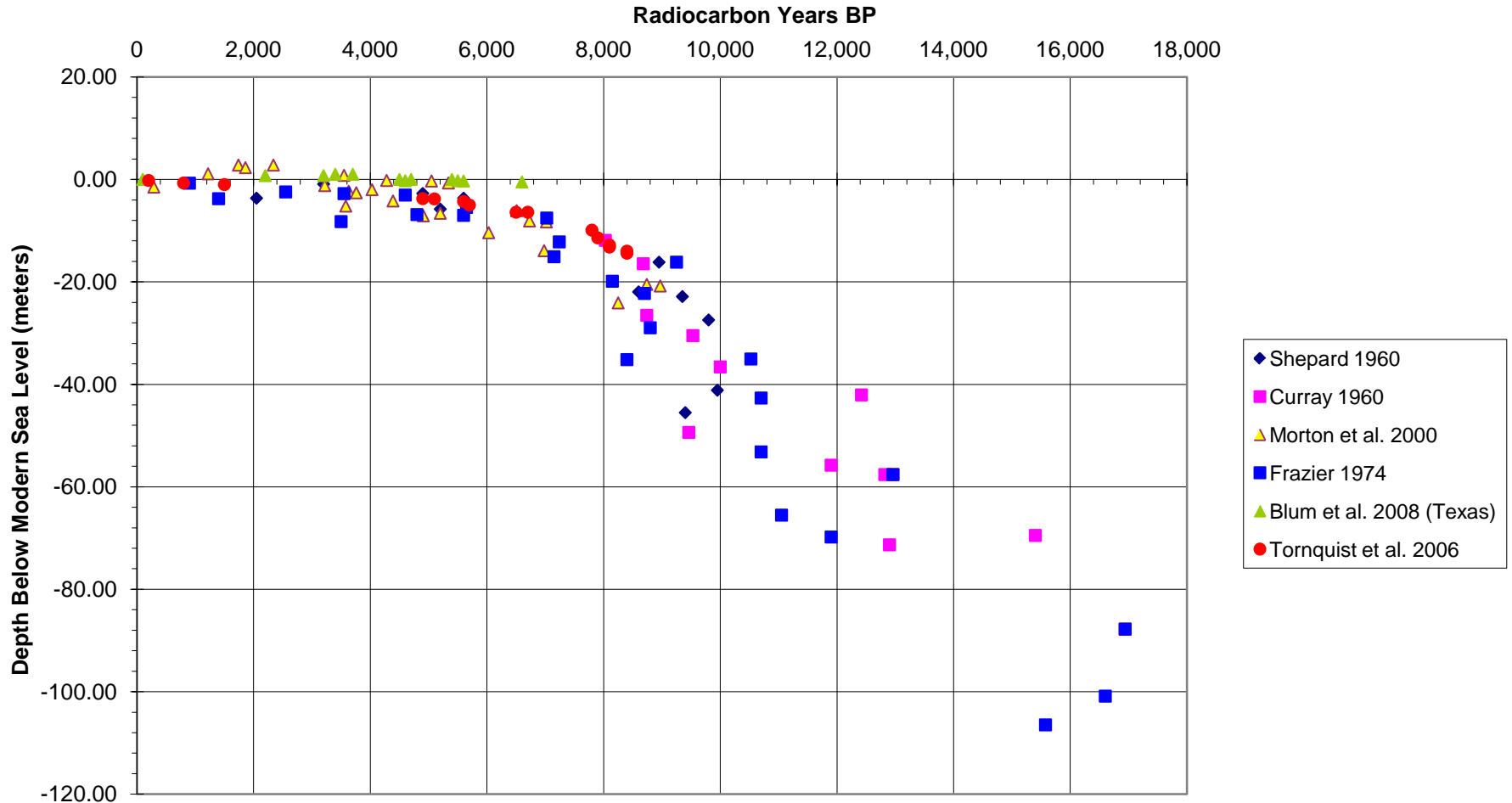


Secondary Objectives: Additional Features

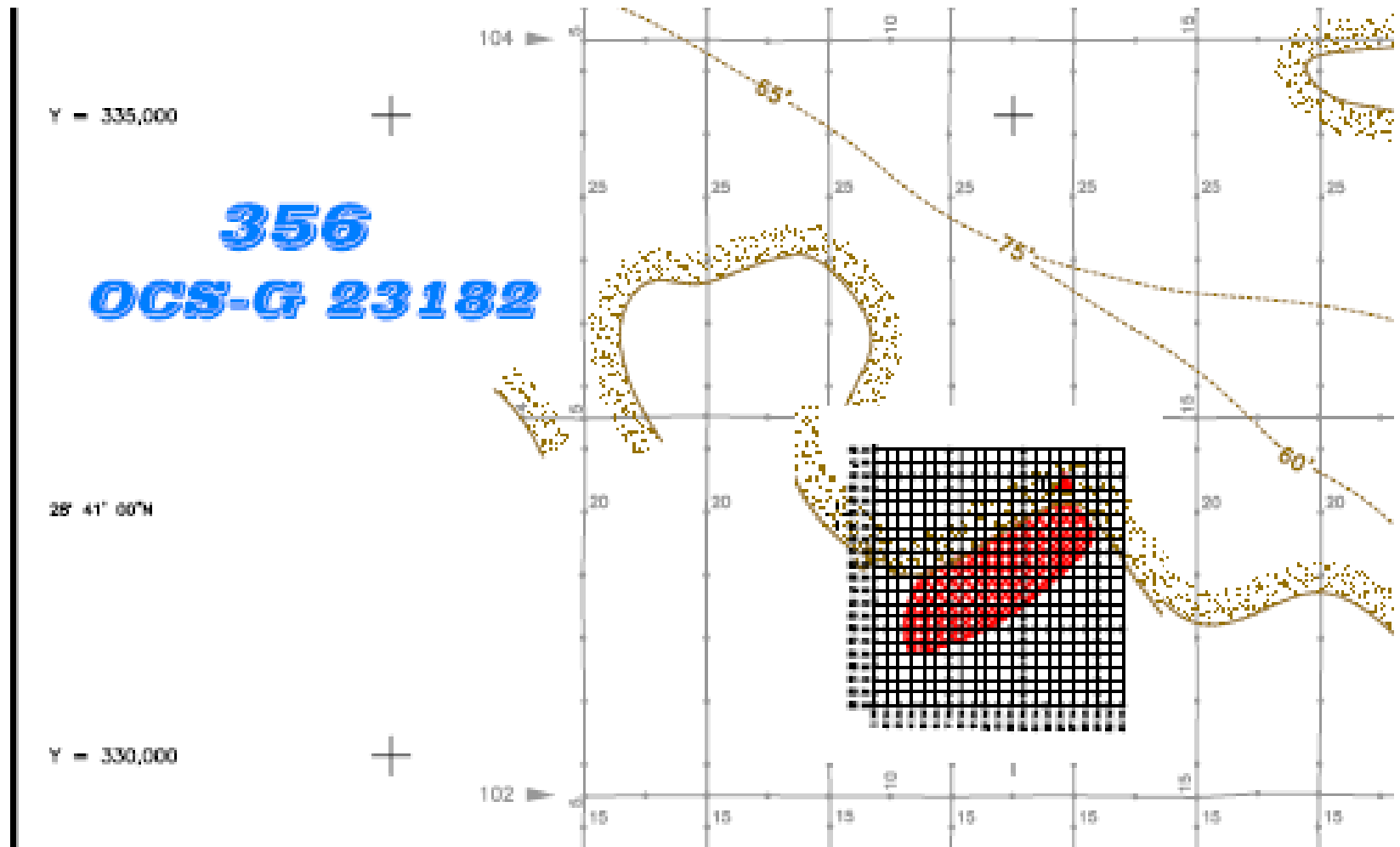
- 204 industry surveys reviewed
 - Location
 - Sub-bottom data quality
 - Geologic interpretation
 - Raw data availability
- 10 additional sites selected
 - Galveston and High Island areas

Secondary Objectives: Sea-Level Curve

NW Gulf of Mexico Sea Level Data



Secondary Objectives: Survey Parameters

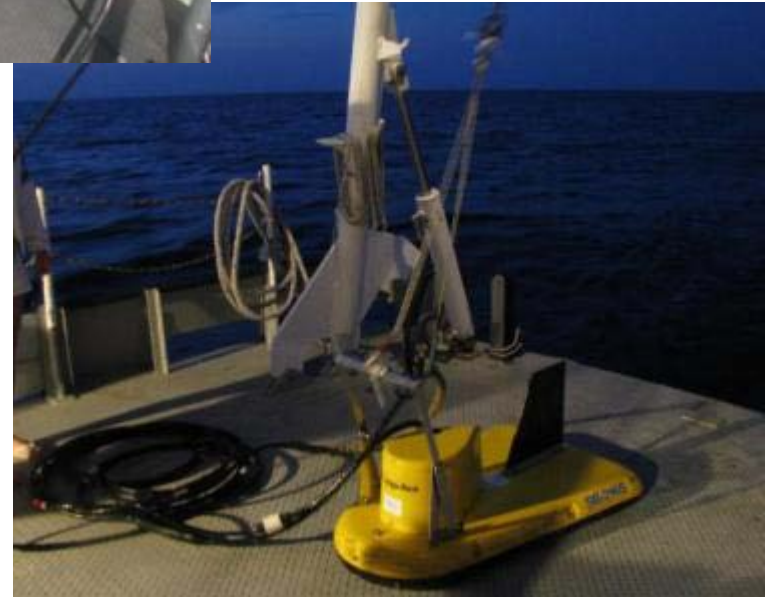


Originally identified from survey using 300m line spacing with 900m tie lines

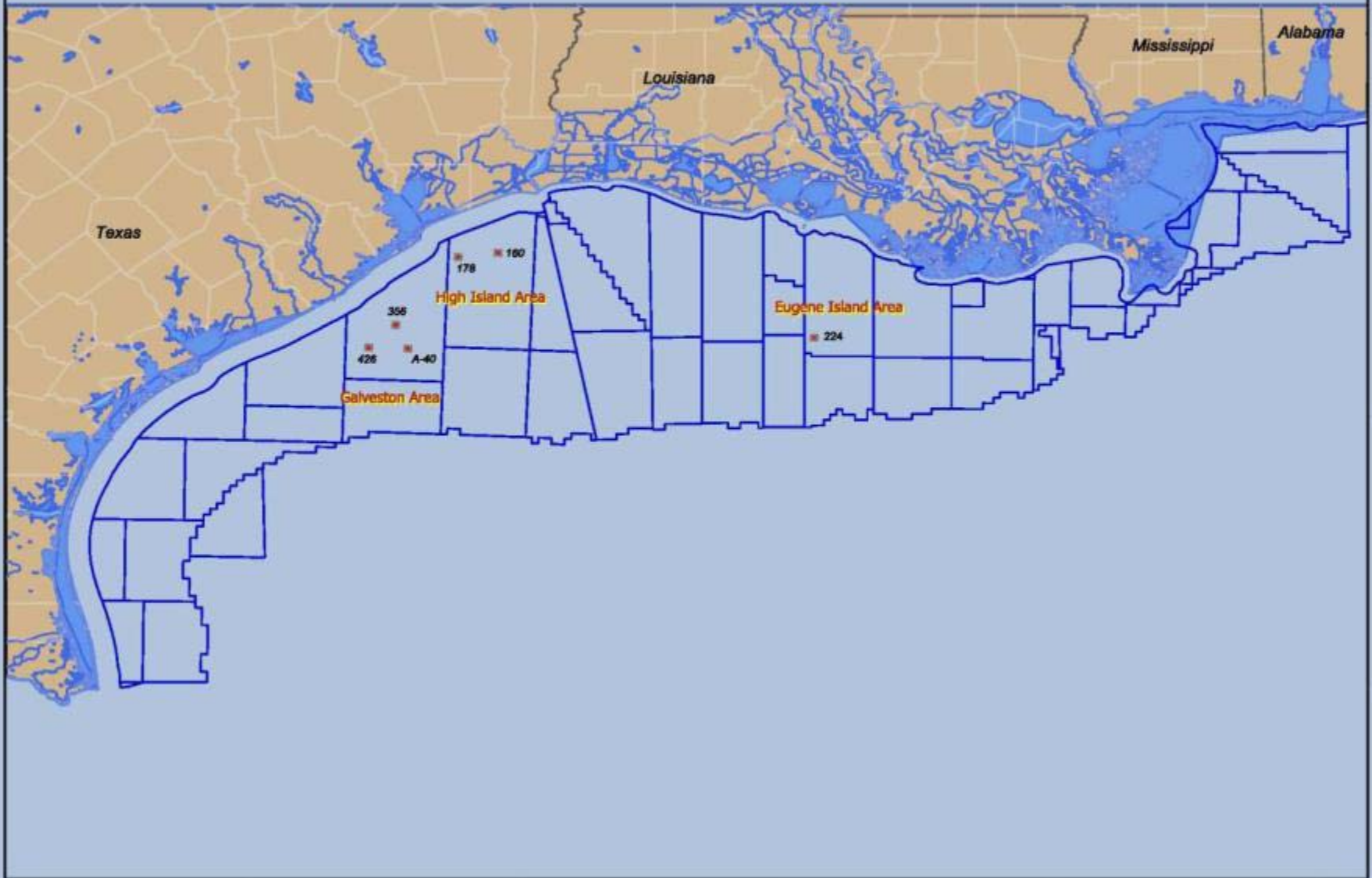
Geophysical Survey: 2008



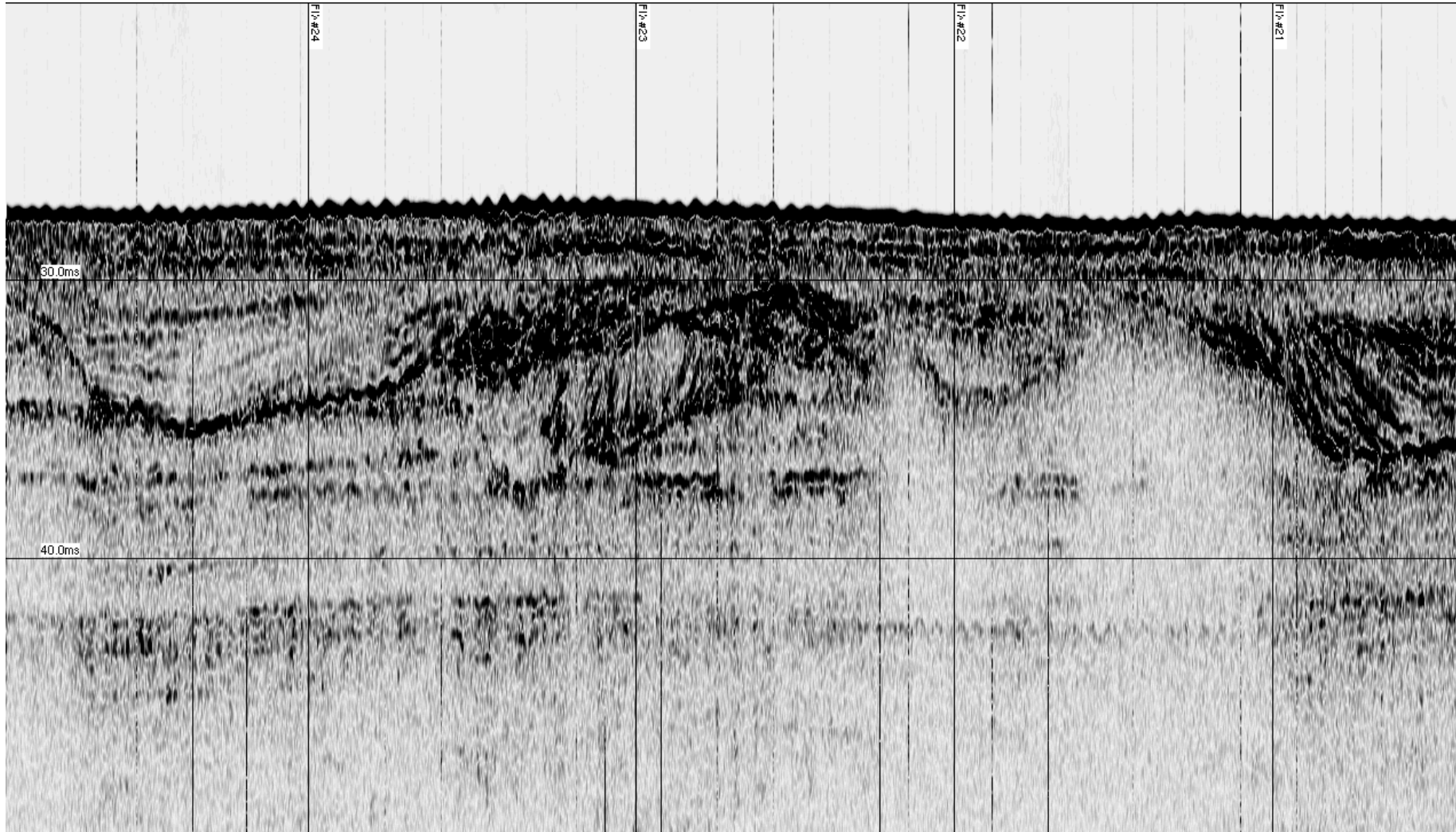
Edgetech
SB216 Chirp
sub=bottom
profiler



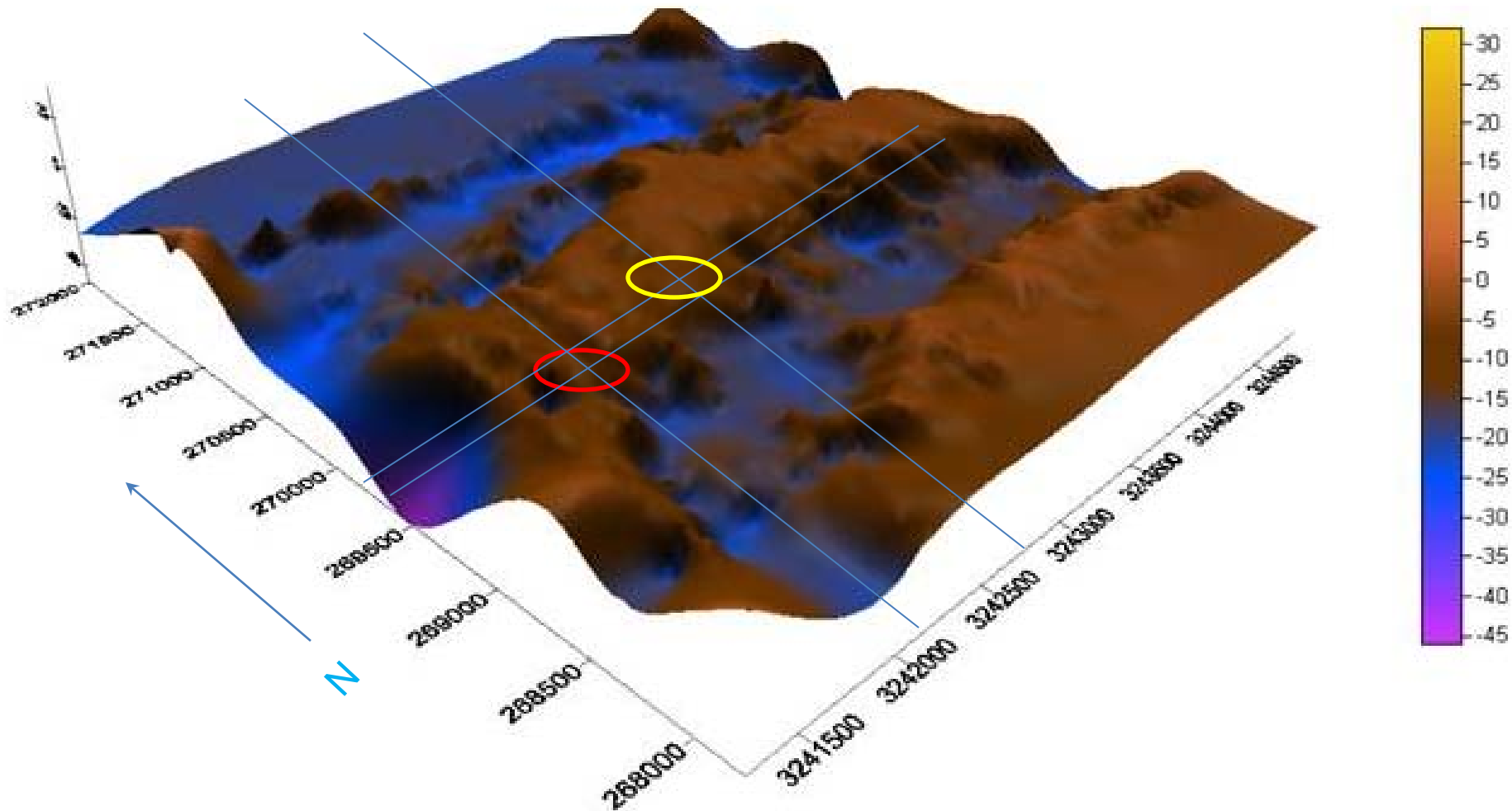
Survey Locations



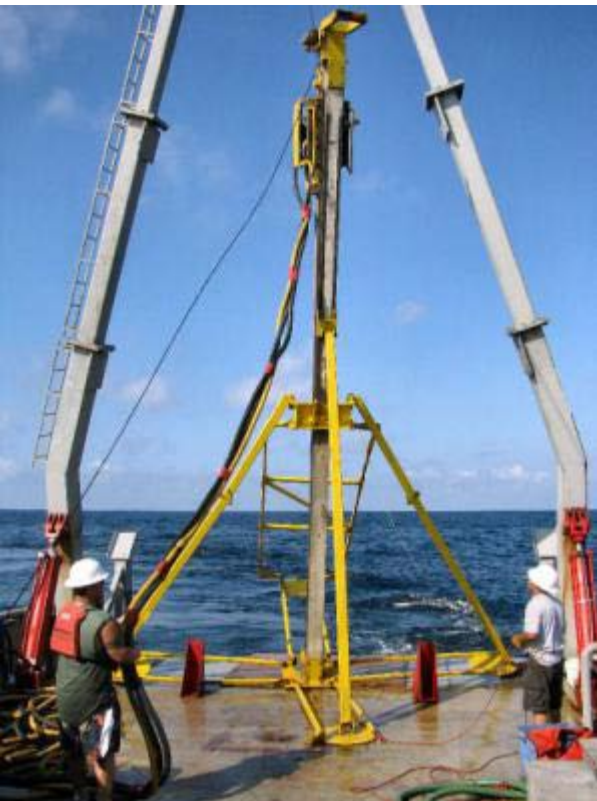
A data sample from the original survey report depicts a highly reflective inset terrace within a shallow channel.



Contoured image of CMI 2008 survey data for GA426 shows two buried channels separated by a topographic rise. Approximate location of cores 1, 9, 10, 11 shown in red.



Coring Operations: 2009



Lab Analyses: Ongoing

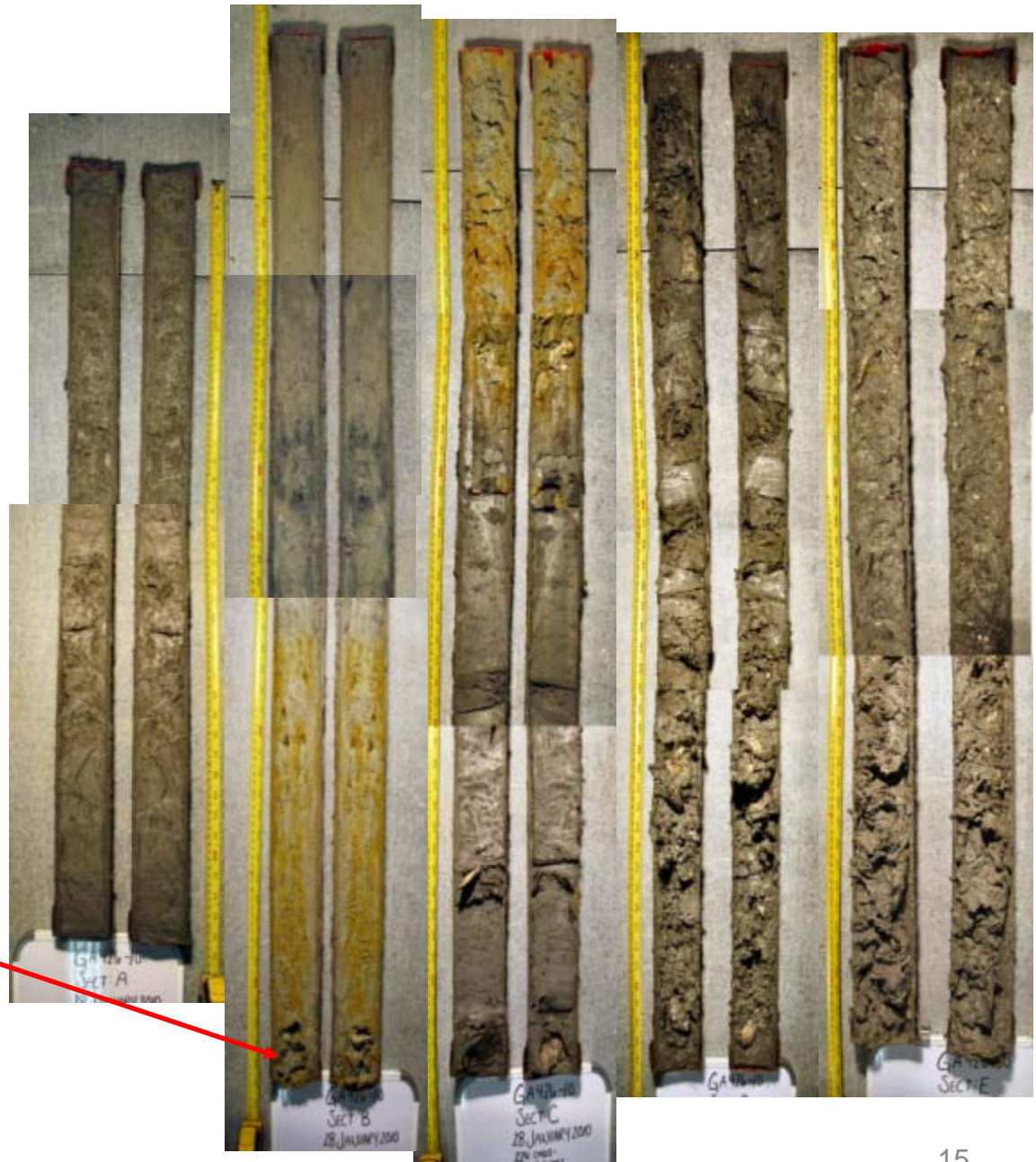
- All cores processed through Geotek Multi-Sensor Core Logger
- Core lithologies
- Sediment analyses
- pH
- Magnetic susceptibility
- Pollen analyses
- Foram analyses
- Radiocarbon dating
- Chemical composition (e.g. phosphates)
- Lipids, fats, proteins

And

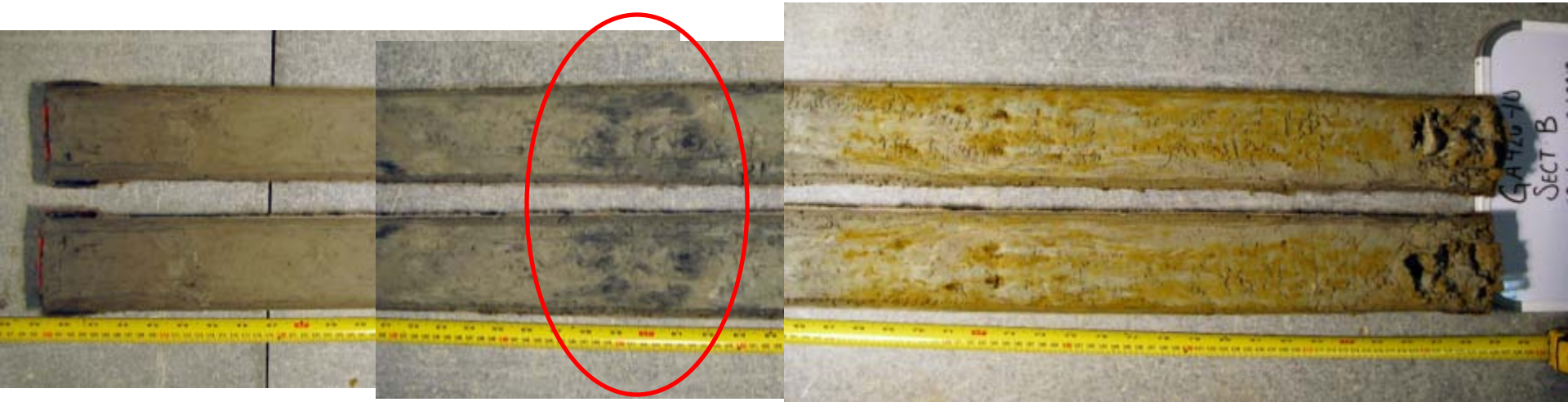
- Potential evidence of human occupation

– 3

Preliminary Results: GA426 - 10

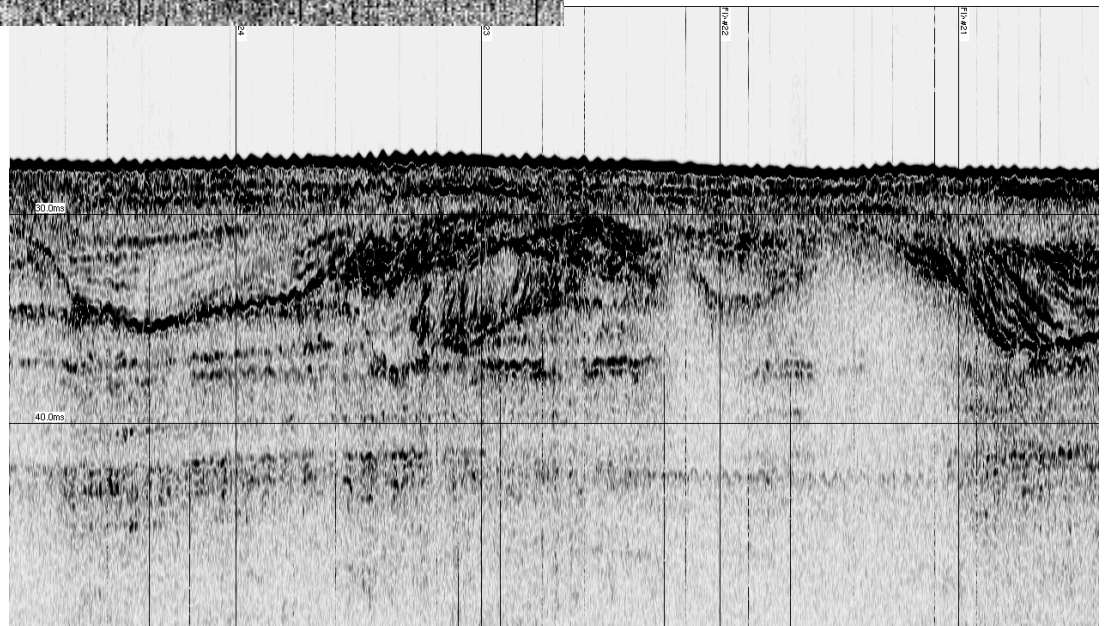
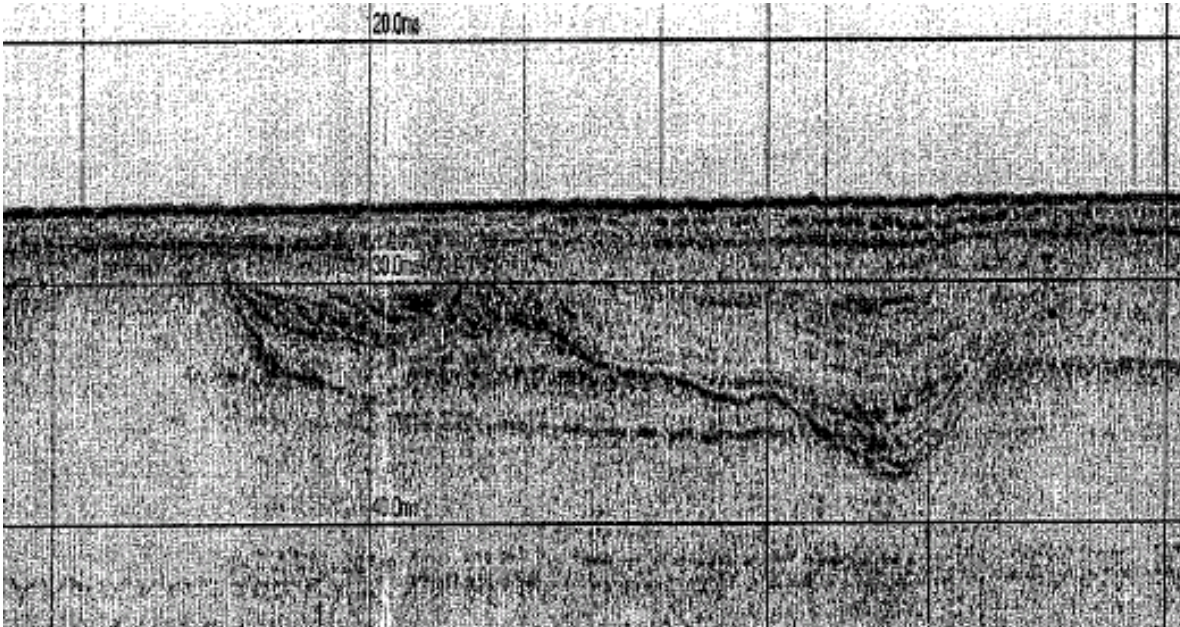


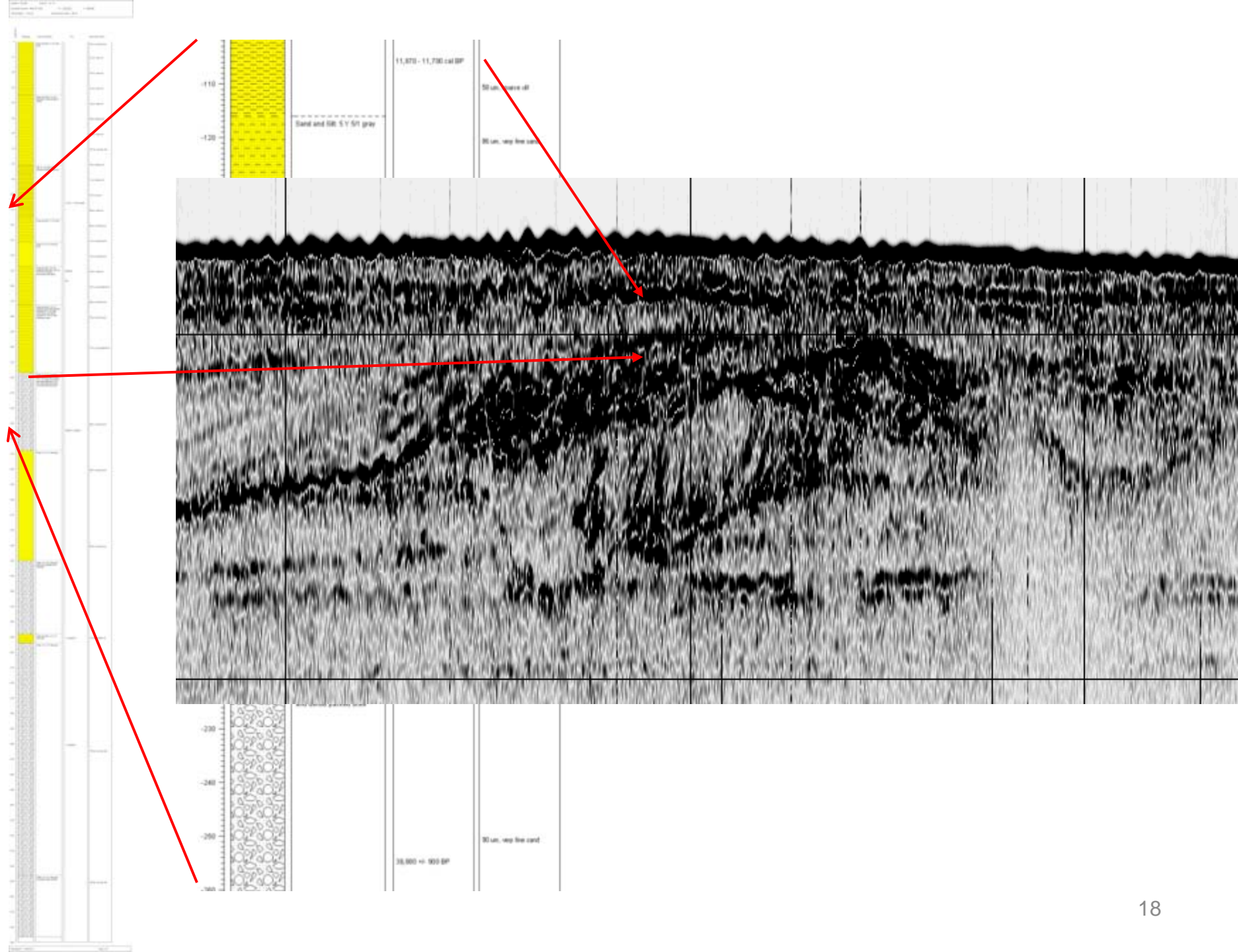
GA426-10 Section B



Charcoal dates to ~41,000 BP

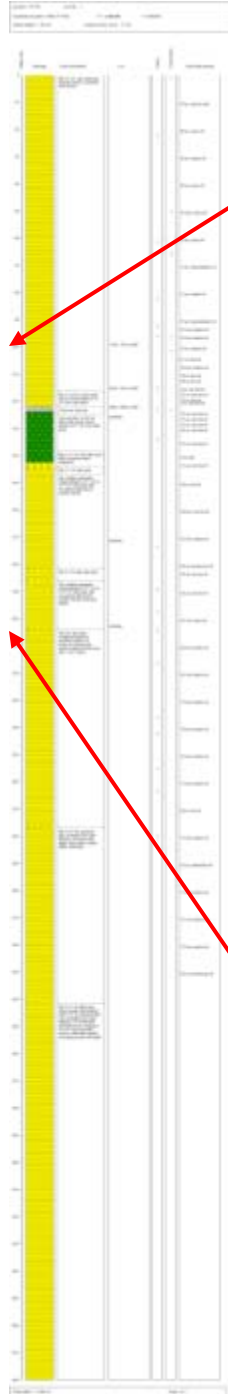
A data sample from the original survey report depicts a highly reflective inset terrace within a shallow channel.



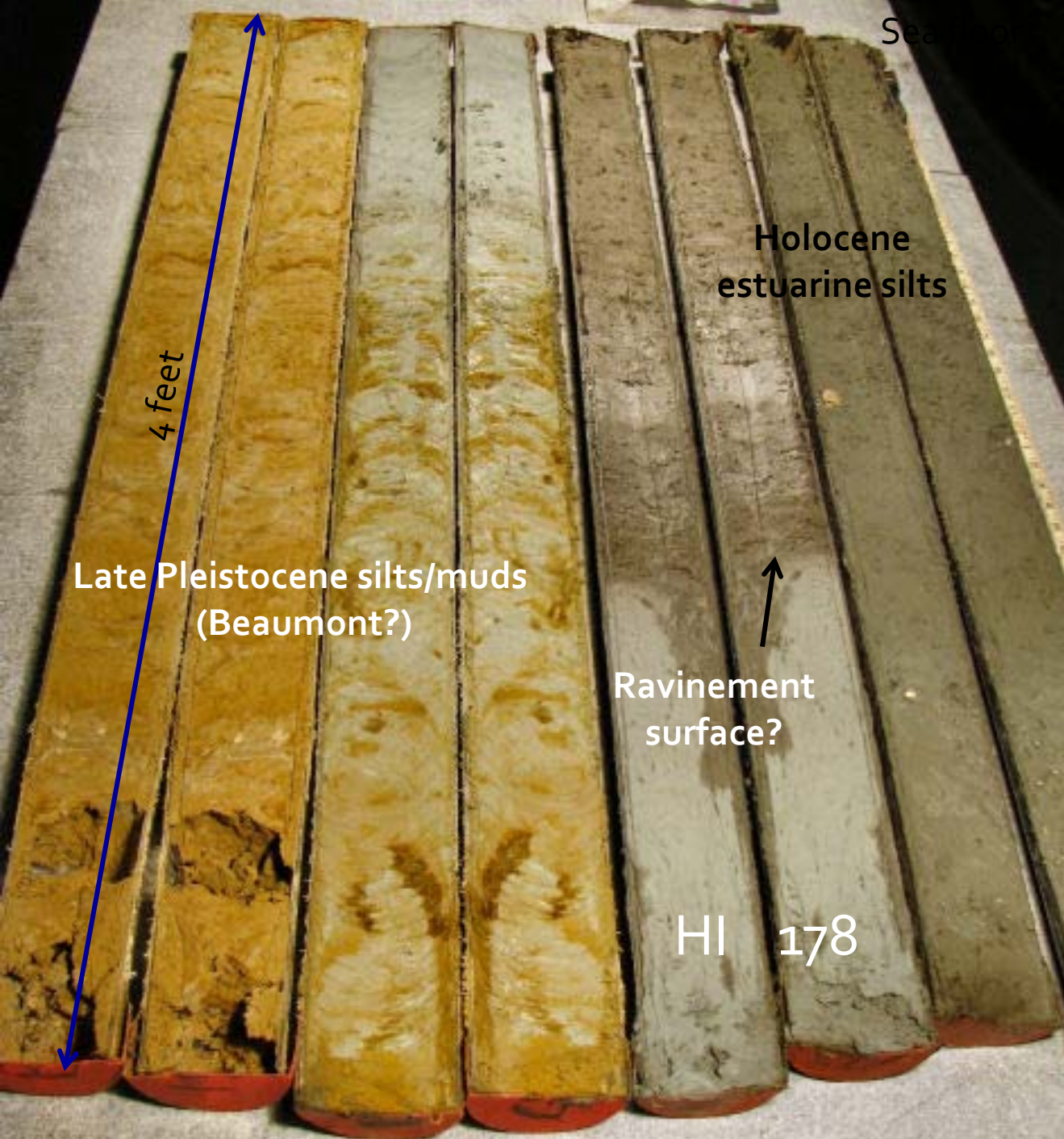


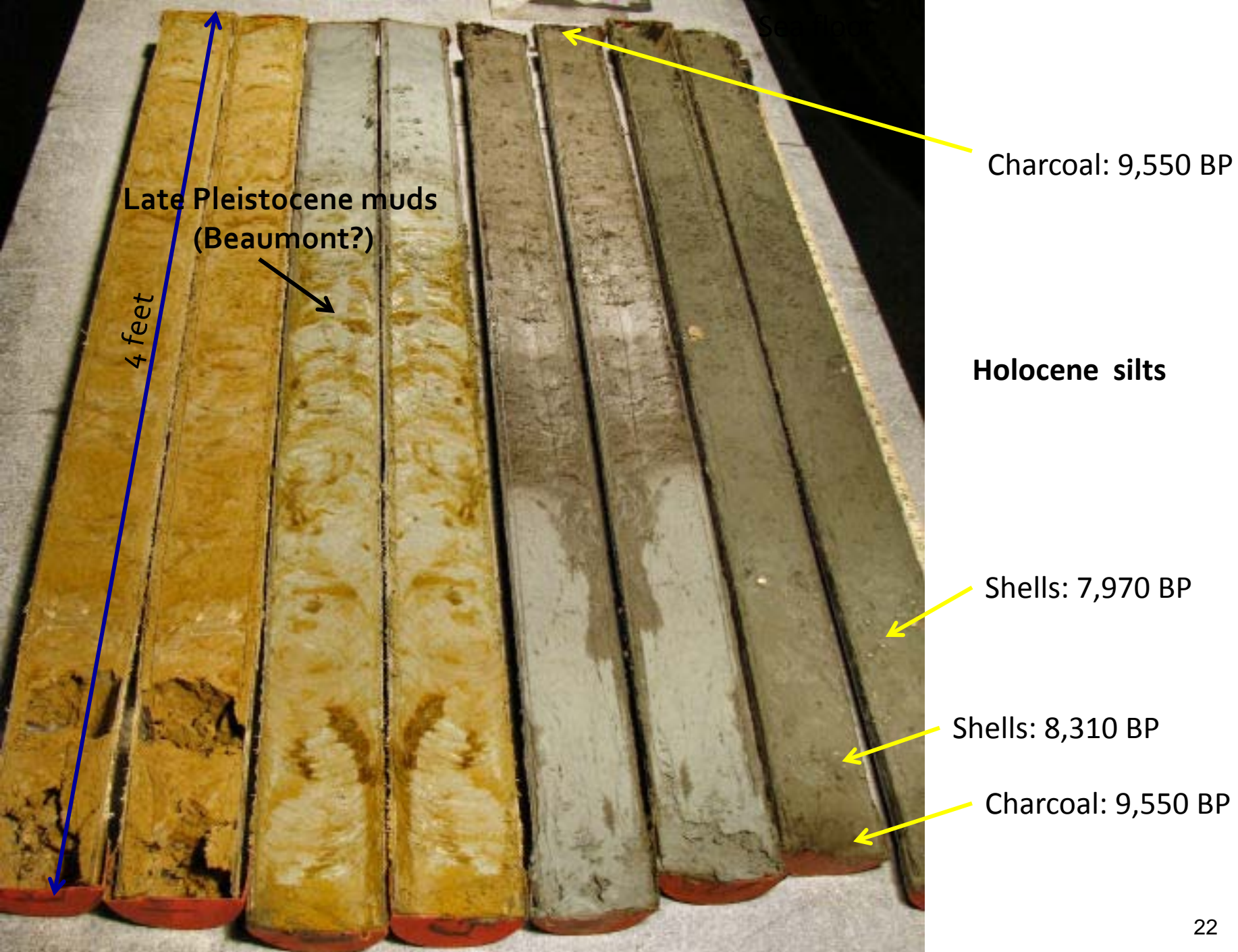
Preliminary Results: HI 178-1





100			7780 - 7970 cal BP			F	15 um, medium silt
-110							6.1 um, fine silt
							10.8 um, medium silt
-120			8070 - 8310 cal BP	P			7.8 um, fine silt
		Silt: 10 YR 2/1, black with some 3-5mm lenses of 5 Y 3/1 (very dark gray)					5.9 um, fine silt
-130		Charcoal: charcoal	9460 - 9550 cal BP	P		F	3 um, very fine silt
		Clay and Silt: 10 YR 2/1, black with some 3-5mm lenses of 5 Y 3/1 (very dark gray)	pending				3.2 um, very fine silt
-140							7.3 um, fine silt
		Silt: 2.5 Y 3/1 very dark gray with occasional shell fragments		P			3 um, very fine silt
-150		Silt: 5 Y 4/1 dark gray					3.3 um, very fine silt
		Silt: mottled sediments range between 2.5 Y 3/1 to 2.5 Y 4/1 dark gray with occasional dark brown organic lenses					3.9 um, very fine silt
-160							3.3 um, very fine silt
-170			pending				2 um, clay
-180		Silt: 4 / N4, dark gray gley		P			3.7 um, very fine silt
-190		Silt: mottled sediments range between 2.5 Y 3/1 to 2.5 Y 4/1 dark gray with occasional dark brown organic lenses, and sand lenses					4.0 um, fine silt
-200			pending				2.95 um, very fine silt
							22.2 um, medium silt
							5.4 um, fine/very fine silt
				P			3.9 um, very fine silt
							3.6 um, very fine silt
				P			
							42.2 um, coarse silt
				P			





Late Pleistocene muds
(Beaumont?)

4 feet

Charcoal: 9,550 BP

Holocene silts

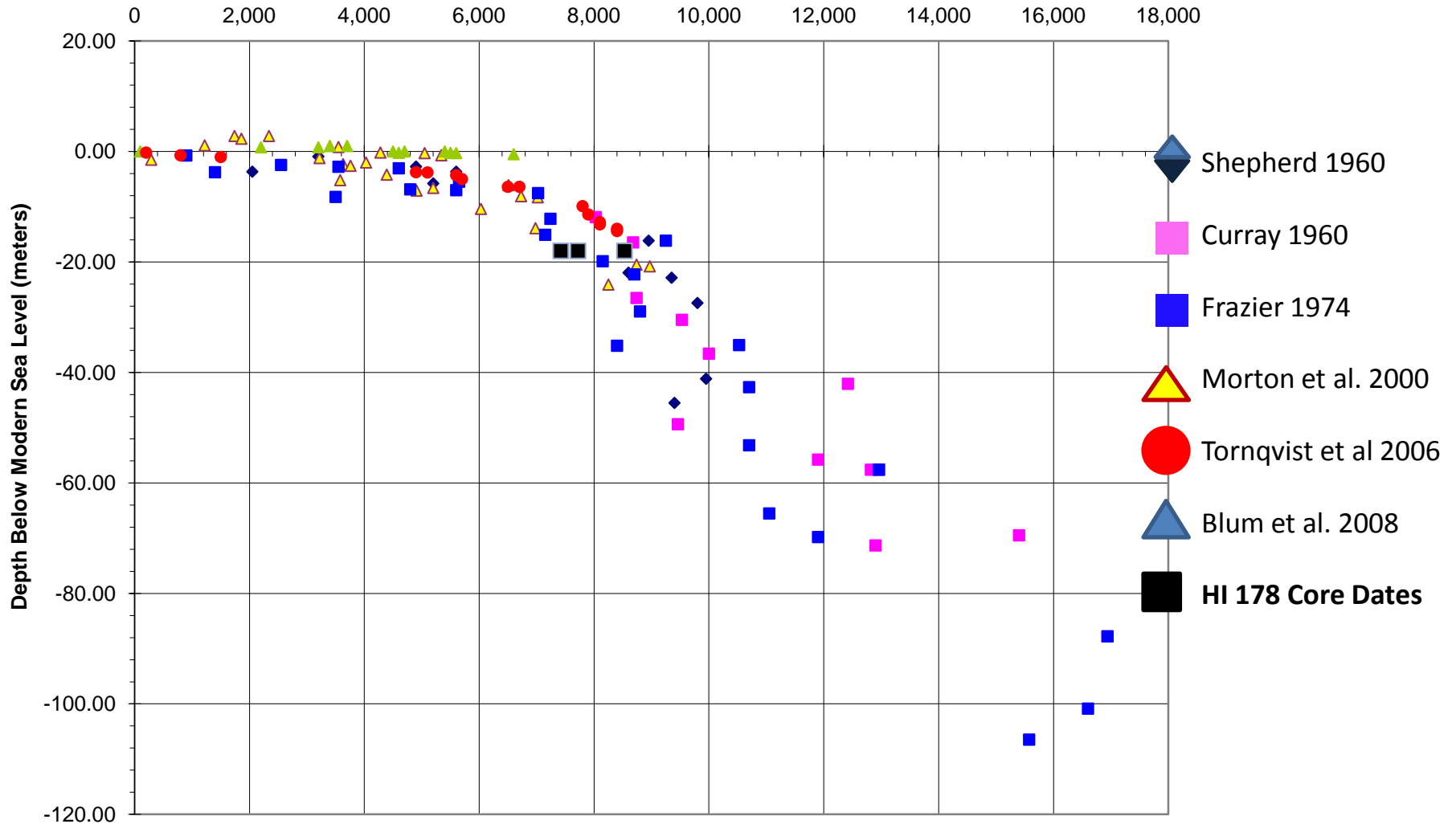
Shells: 7,970 BP

Shells: 8,310 BP

Charcoal: 9,550 BP

NW Gulf of Mexico Sea Level Data

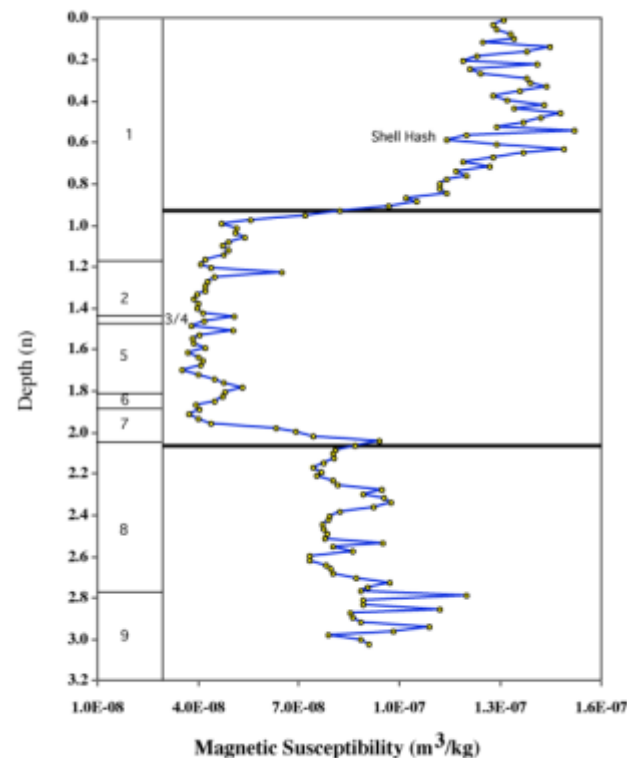
Radiocarbon Years BP



Magnetic Susceptibility



All materials become magnetized in inducing magnetic fields, and magnetic susceptibility (MS) is a measure of the magnitude of this. In special cases, such as in heaths, fired material acquires a strong MS due to conversion of/or oxidation of iron-bearing compounds in the parent material to strongly magnetic iron oxides.

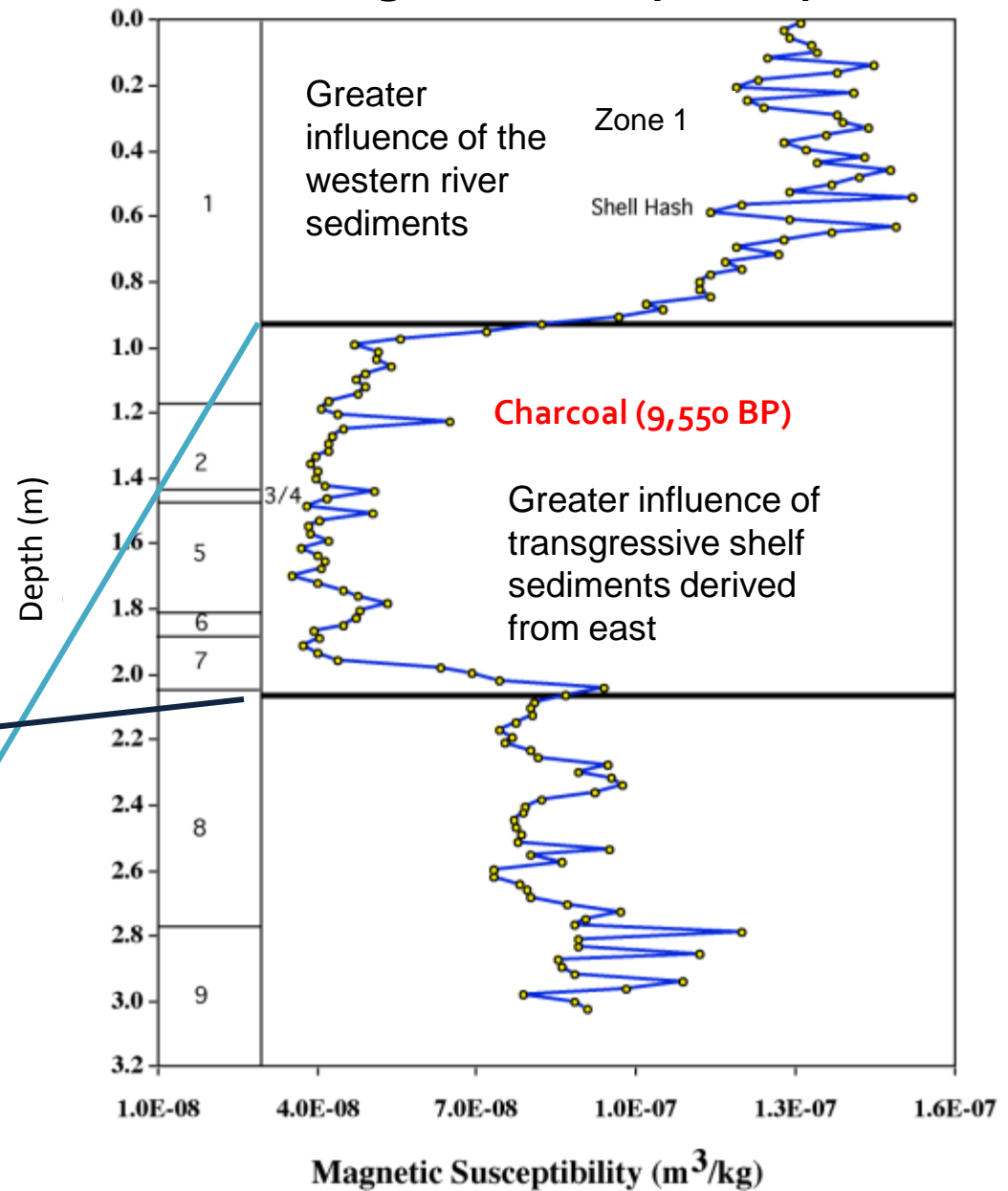


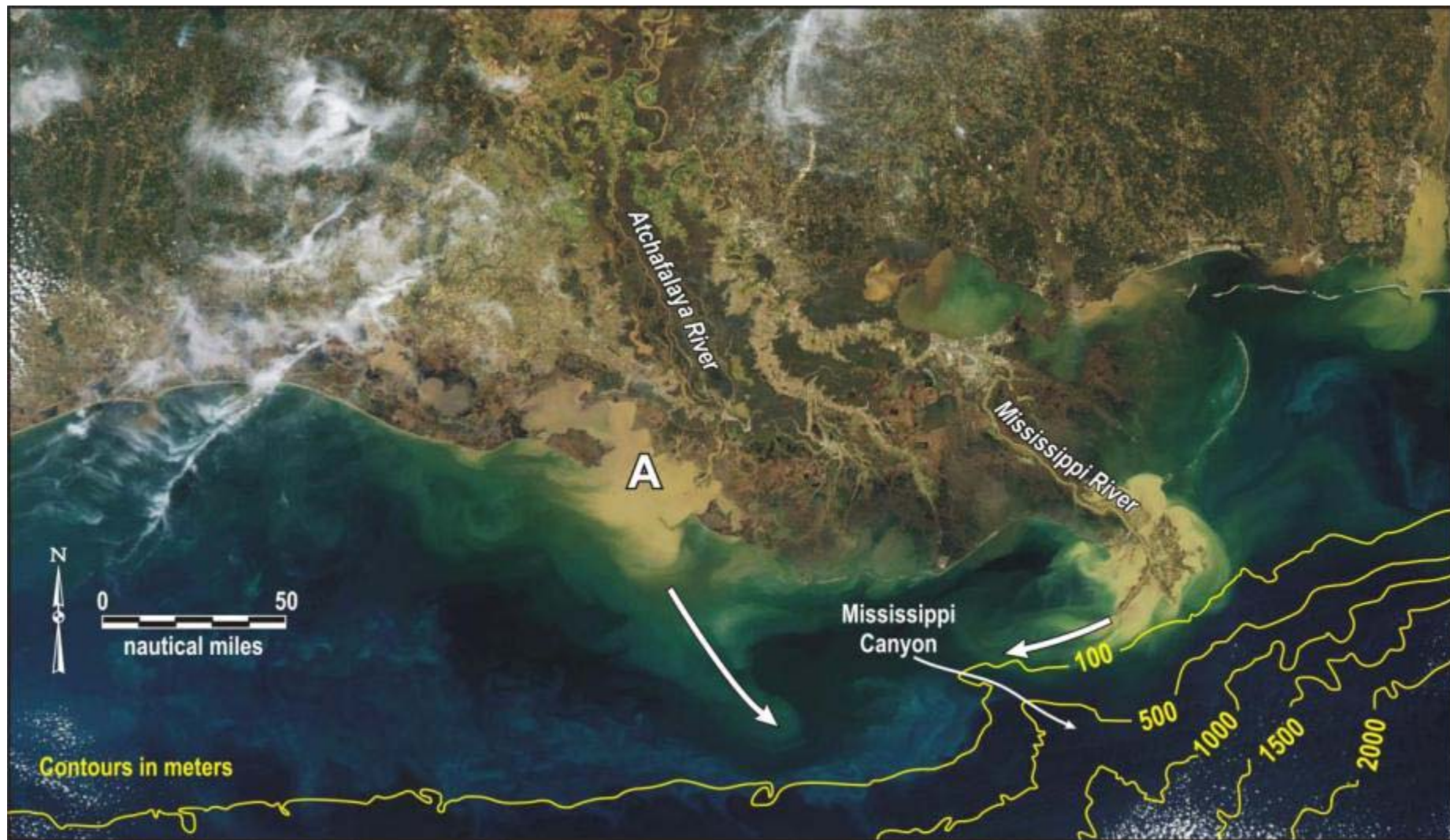
Late Pleistocene
silts/muds

Holocene
estuarine silts



Magnetic Susceptibility

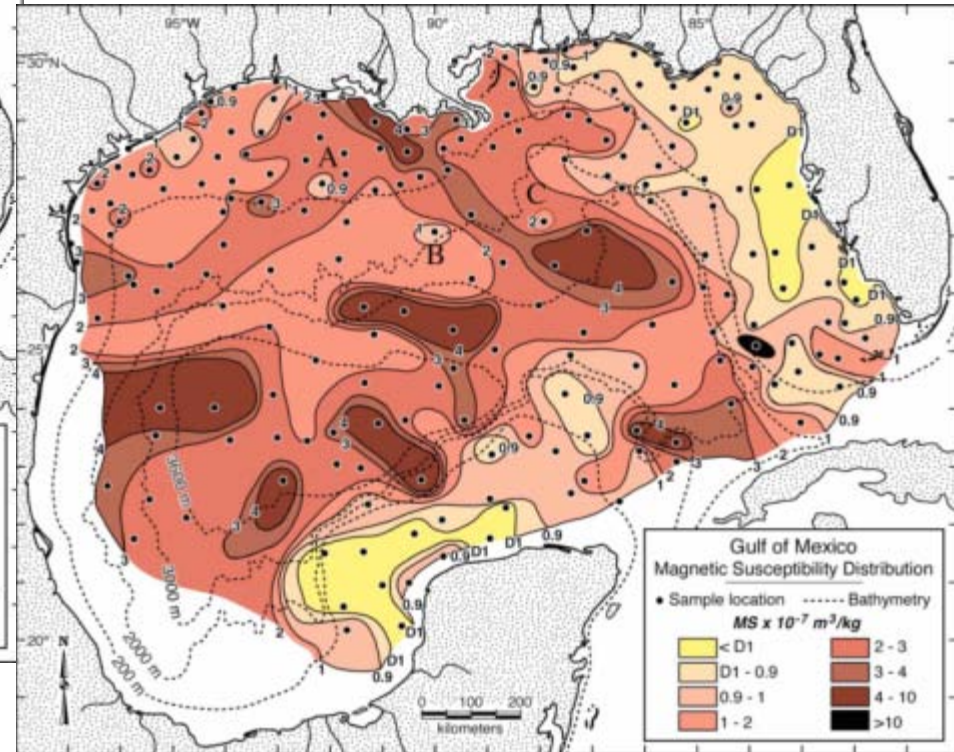
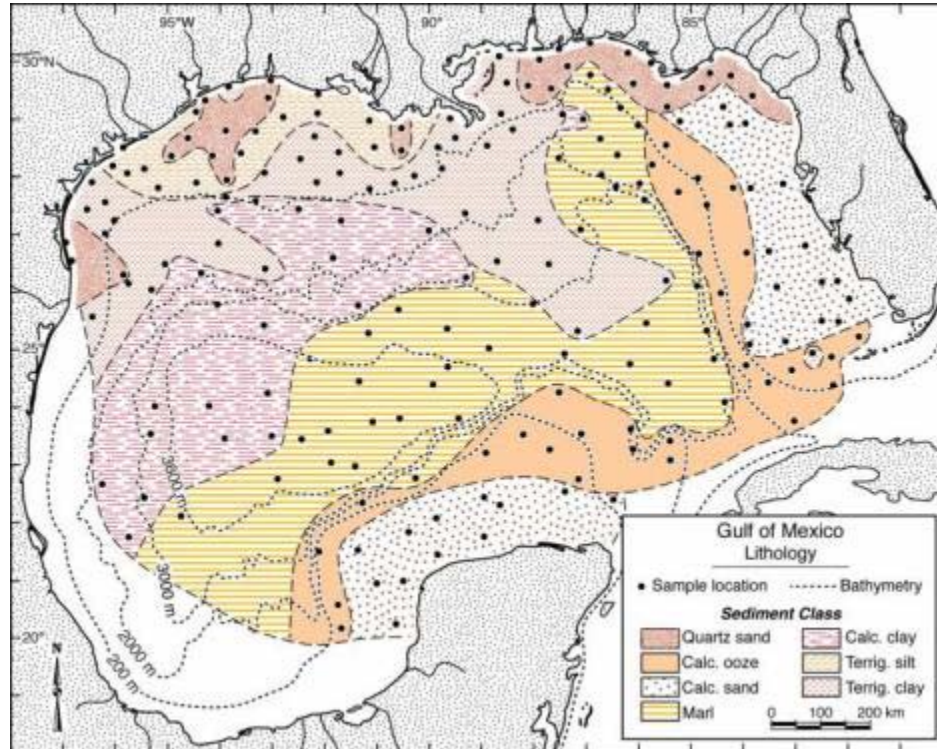




(Ellwood et al. 2006)

Lithologic variations in the Gulf

Current MS variations in the Gulf



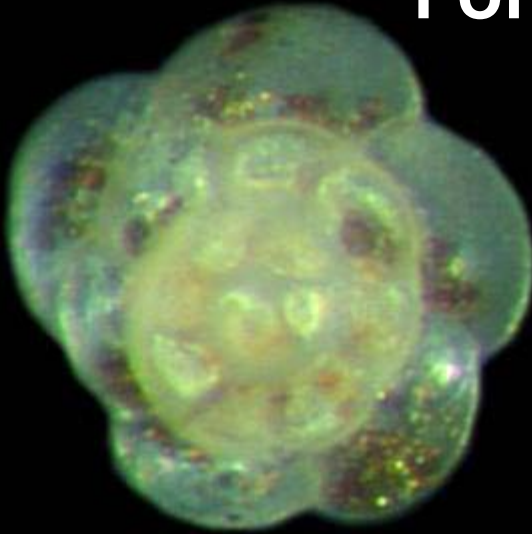
The MS signature would have varied spatially in the past

MS is a measure of all the compounds making up the sediment sample

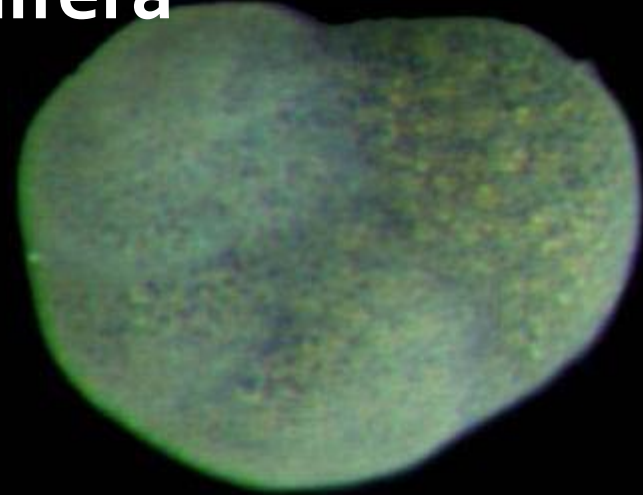


Unknown fibers,
diagonal square
is 500 um

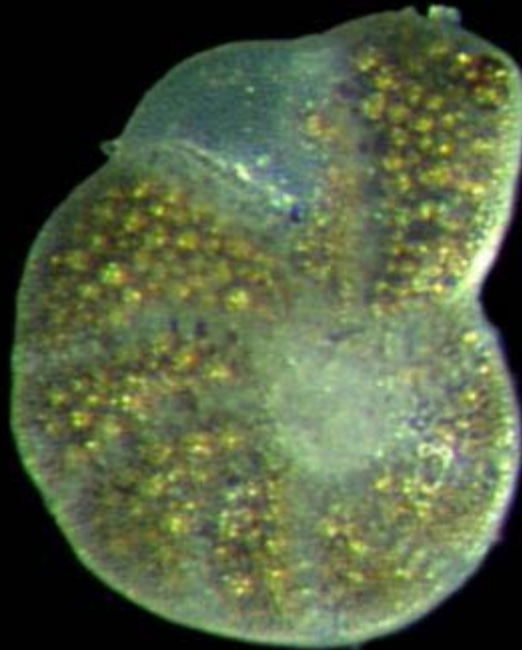
Foraminifera



Ammonia
Parkinsoniana



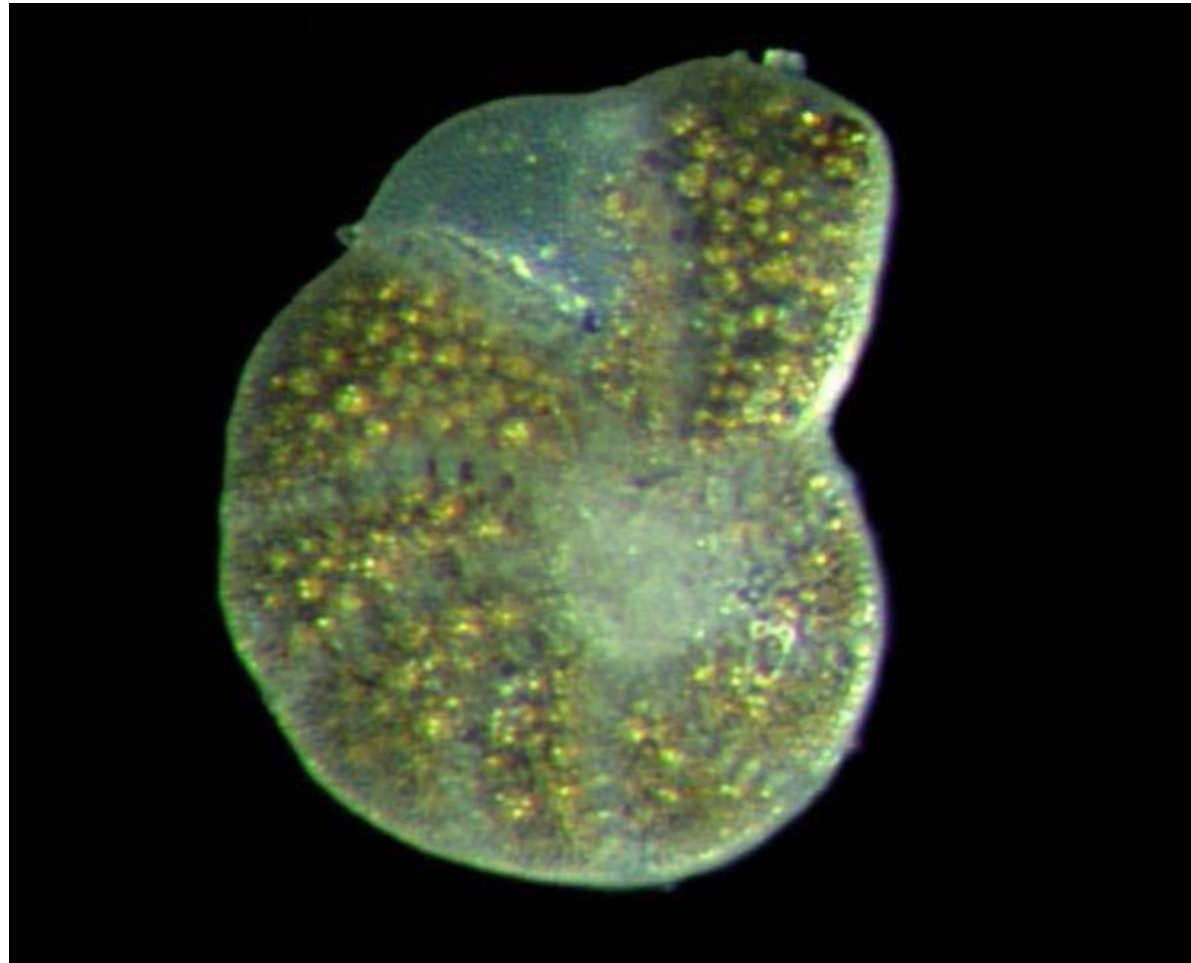
Rosalina sp.



Elphidium
excavatun

**Sample from
directly
beneath the
charcoal
horizon**

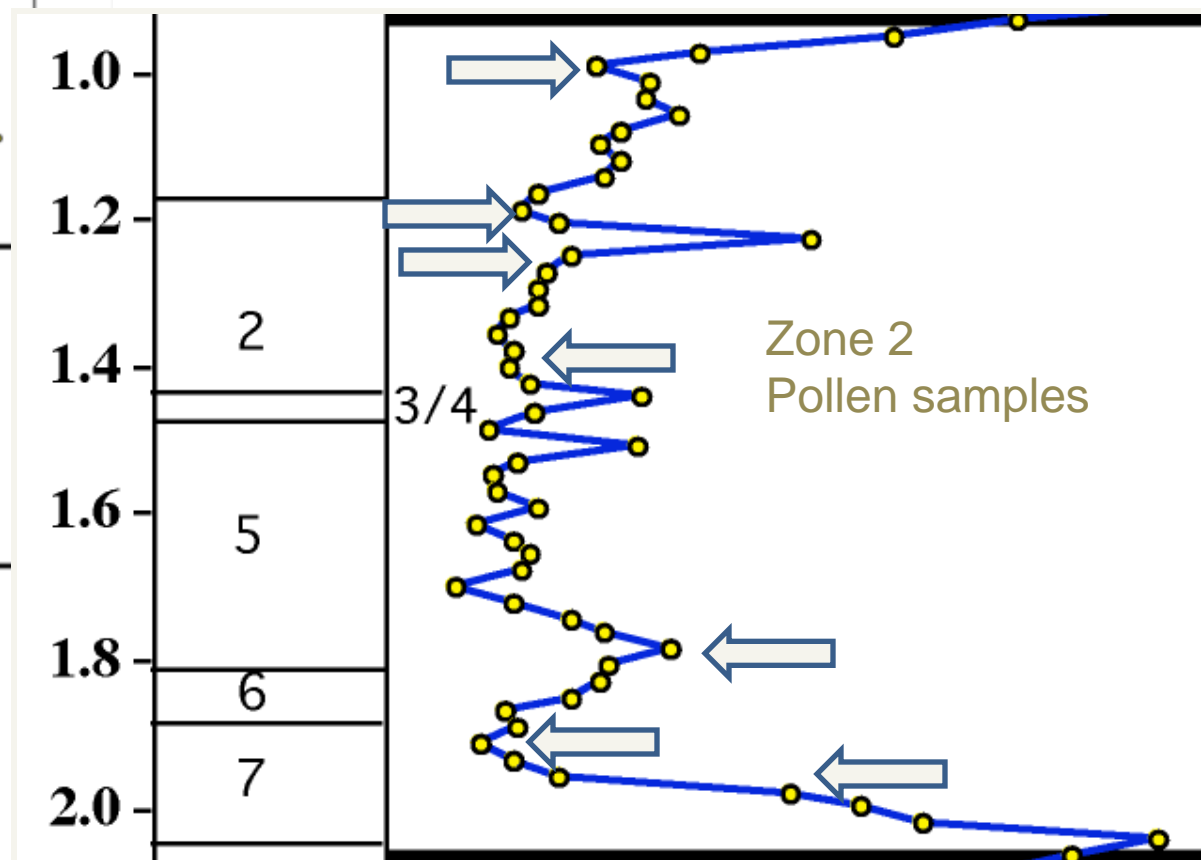
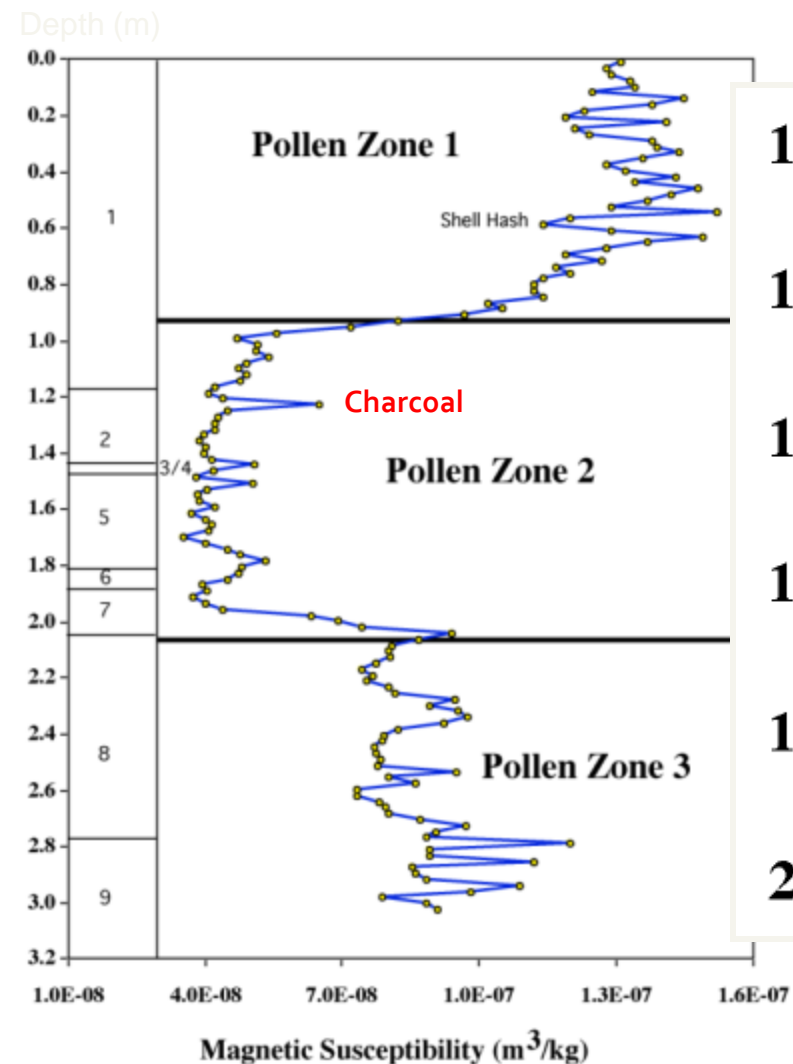
*Elphidium
excavatun*



Chambers replaced with 'gold' (pyrite)

Indicative of a reducing environment and stagnation
and
Brackish water/restricted environment

Palynology



Preliminary palynological results:

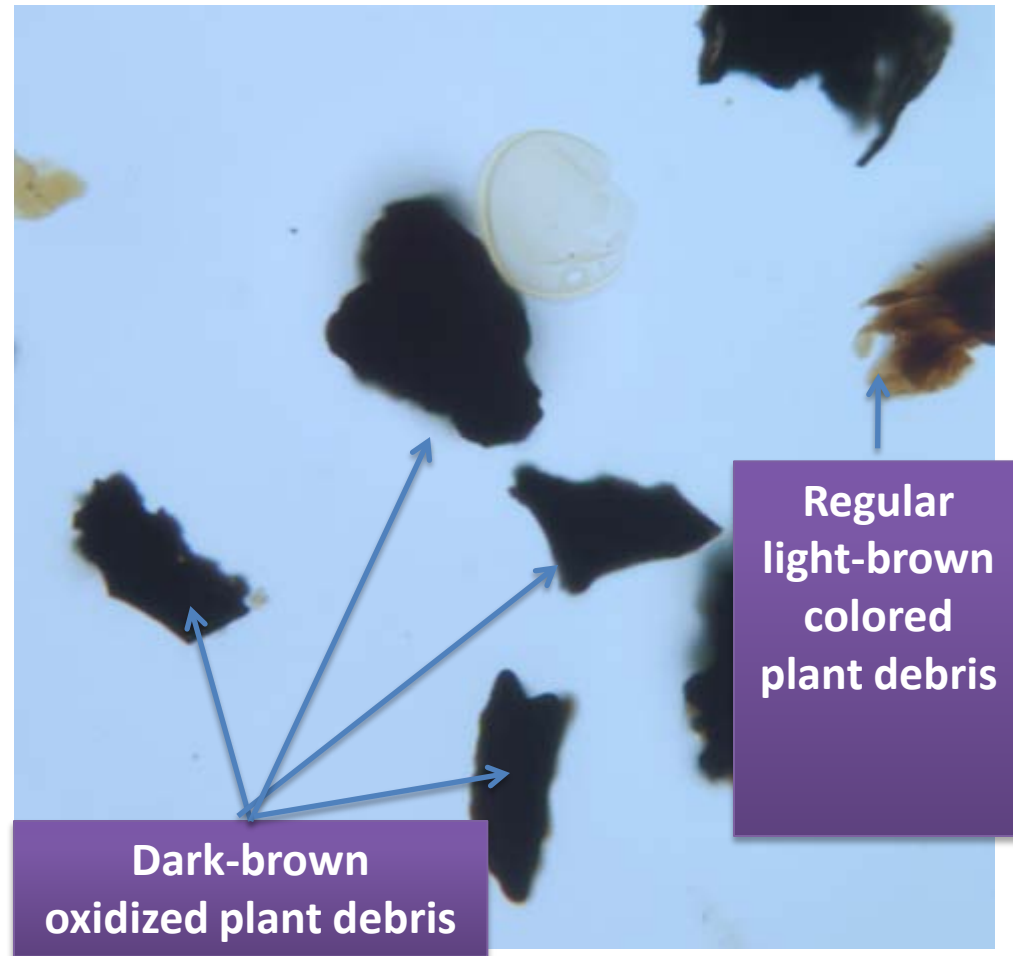
This site was most likely deposited above sea-level because of the following:

Absence of marine palynomorphs such as dinoflagellate cysts and Acritarchs (unicellular microfossil).

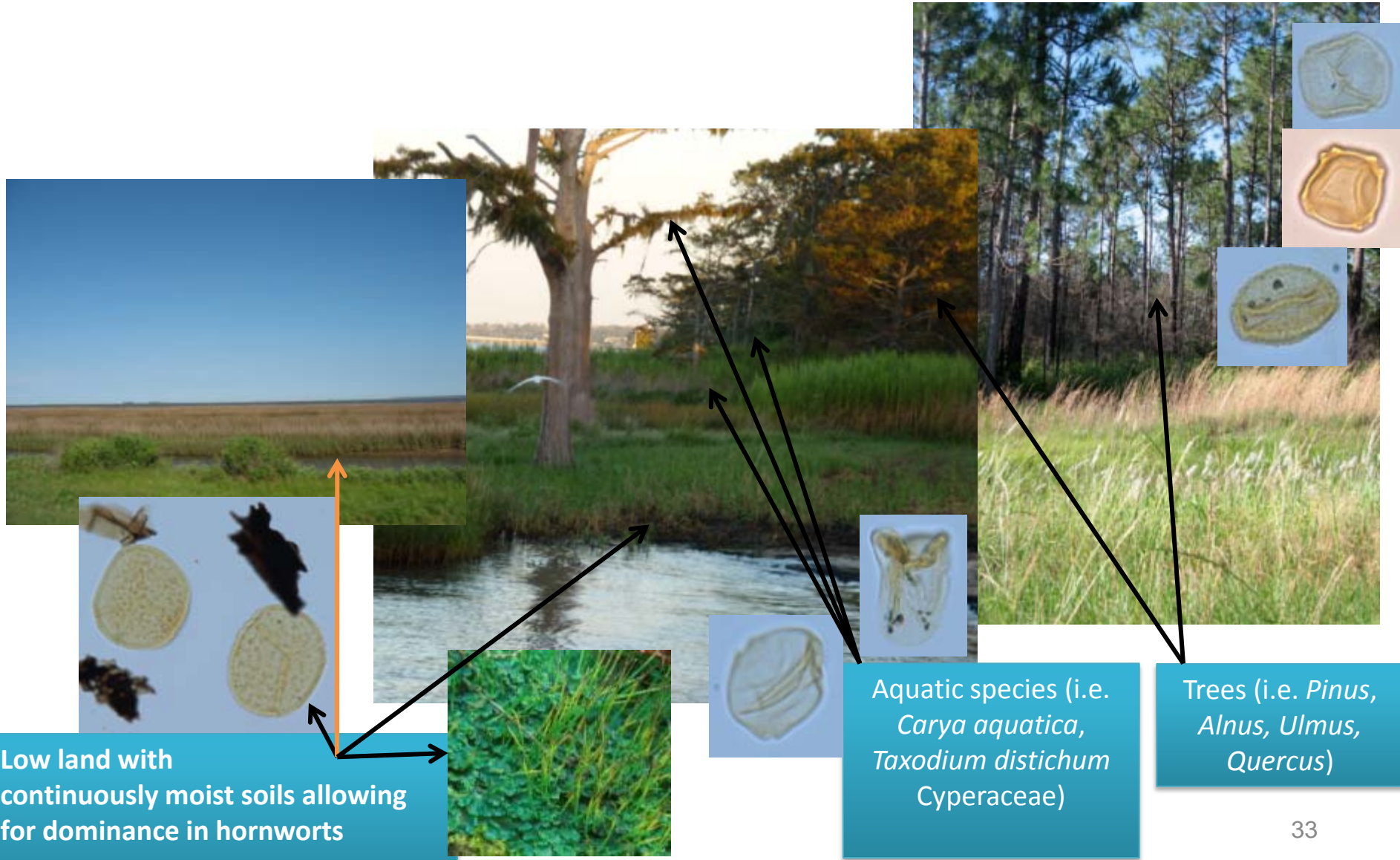
Abundance in pollen (including bee-pollinated types) indicating that the source of pollen is most likely *in-situ* vegetation and not drainage transport.

Abundance in fungi spores indicating that local vegetation had the time to undergo decay.

Abundance in highly oxidized organic matter most likely resulting from oxidation via fires.



The site could have looked like this ...



This site could have been occupied by humans because

There are few trees and abundant species indicative of disturbance/clearing (i.e. Helianthoid –related to sunflower family)

Common species include Chenopodiaceae. These plants are known to have been used by past societies as

- Vermifuge (expels parasites)

- Drug

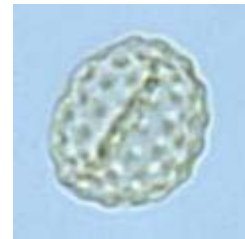
- Flour or vegetables

There are abundant Graminae, but most are under 70 microns and hence, they cannot qualify as corn... but they could be related to one of the corn ancestors?

Helianthoid pollen



Chenopodiaceae pollen



Large Graminae



But evidence for this statement are not 100% conclusive as these species could also be there naturally, without human input.

The core and sediments indicate gradually rising sea level and inundation /flooding of a low energy system prior to ~10,000 cal. years BP.

Forams indicate a brackish, low energy environment, immediately below the suspected hearth.

Around 9,500 BP a low terrace or floodplain was possibly utilized by palaeoindians.

The pollen indicates disturbance by humans.

The environment is one comprising a mix of woodland, open grassland and wetland – therefore highly favorable to exploitation by palaeoindian populations.



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Harry Roberts
Jennifer Gardner
E. Cory Sills
Lorene Smith

References

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